

IN THE U.S. PATENT & TRADEMARK OFFICE

Applicants: Masahiro YOSHIOKA et al
Serial No.: 10/575,776 Group: 1796
Filed: April 13, 2006 Examiner: Pak
For: Black Composition, Black Coating Composition, Resin Black Matrix,
Color Filter for Liquid Crystal Display and Liquid Crystal Display

DECLARATION UNDER 37 C.F.R. § 1.132

Honorable Commissioner of Patents and Trademarks

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Sir:

I, Ryo NAGASE, a nation of Japan, residing at 10-A7-31, Sonoyama 2-chome, Otsu-shi, Shiga 520-0842 JAPAN, do hereby declare as follows:

I am a co-applicant of the invention as described and claimed in the specification of the above-identified application.

I am familiar with the Office Action dated April 29, 2009, in which claims 1-9, 11-15 and 17-25 are rejected.

To show the patentability of the present invention, I carried out the experiments described below.

Experiments

1. Purpose of Experiments

To examine whether the black composition described in Tsukamoto et al (JP2000-143985) is within the scope of claim 1 or not.

2. Methods and Results

Example 1 of Tsukamoto et al was followed as detailed below to prepare a resin black matrix. As the titanium nitride oxide, a product (trade name: 13M-C (lot No.: 040901) commercially available from Mitsubishi Materials Electronic Chemicals Co., Ltd. was used.

More specifically, I carried out the following experiments:

(1) Synthesis of Polyamic Acid Solution

In γ -butyrolactone (3825 g), pyromellitic dianhydride (149.6 g) and benzophenonetetracarboxylic dianhydride (225.5 g), 3,3'-diaminodiphenylsulfone (69.5 g), 4,4'-diaminodiphenyl ether (210.2 g) and bis-3-(aminopropyl)tetramethylsiloxane (17.4 g) were allowed to react at 60°C for 3 hours, and then maleic anhydride (2.25 g) was added, followed by reacting the resulting mixture at 60°C for another 1 hour to prepare a polyamic acid solution (polymer concentration: 15% by weight) which was a precursor.

(2) Preparation of Black Composition

The diffraction spectrum of the powdery titanium nitride oxide, that is, the product (trade name: 13M-C (lot No.: 040901) commercially available from Mitsubishi Materials Electronic Chemicals Co., Ltd., used as the light shading agent, was measured with an X-ray diffractometer commercially available from Rigaku Corporation. As a result, the X-ray intensity ratio R was 0.430. This titanium nitride oxide in an amount of 11.2 g, 18.7 g of the above-described polyamic acid solution having a polymer concentration of 15% by weight, 57.2 g of N-methyl-2-pyrrolidone, and 12.9 g of 3-methyl-3-methoxybutyl acetate were homogenized together with 100 g of glass beads with a homogenizer at 7000 rpm for 30 minutes to carry out a dispersion treatment, and the glass beads were removed by filtration, to obtain a dispersion of titanium nitride oxide having a concentration of 14% by weight.

To 27.5 g of this dispersion, 3.7 g of the above-described polyamic acid solution having a polymer concentration of 15% by weight, 6.0 g of N-methyl-2-pyrrolidone and 1.8 g of 3-methyl-3-methoxybutyl acetate were added and mixed to prepare a black composition. The weight ratio of the titanium nitride oxide/polyimide resin of the obtained composition was 70/30.

(3) Preparation of Black Matrix

The black composition obtained in (2) above was applied to a substrate to a thickness after postbaking of 0.8 μm , and then prebaking was carried out at 120°C.

(4) Measurement of Minimum Exposure Energy Required for Photo-curing

By the method described in Example 8 in the present specification, the minimum exposure energy was determined.

That is, the obtained black coating film was exposed to lights at varying light exposure energies within the range of 30 mJ/cm^2 to 210 mJ/cm^2 at intervals of every 20 mJ/cm^2 and then each substrate was immersed in 0.04 wt% aqueous potassium hydroxide solution for 120 seconds, followed by postbaking at 220°C as in Example 4 in the present specification after washing with water. As a result, photo-curing of the black coating composition did not occur at any of the light exposure energies. These results indicate that the minimum light exposure energy of the black coating composition was infinite, that is, the composition was not photo-curable.

(5) Measurement of OD of Resin Black Matrix after Photo-curing

The black composition obtained in (2) above was applied to a substrate to a thickness after postbaking of 1.0 μm , and then prebaking was carried out at 120°C. Thereafter, postbaking at 290°C was carried out to photo-cure the polyimide to form a resin black matrix. The thickness of the obtained resin black matrix was 1 μm and

the OD value was 3.6.

(6) Conclusions

By the experiments described above, it was proved that the minimum light exposure energy required for photo-curing of the black composition obtained by following Example 1 of Tsukamoto et al. (JP2000-143985) is infinitive, that is, the black composition obtained by following Example 1 of Tsukamoto et al. is not photo-curable, and that the OD value of the resin black matrix prepared therefrom is 3.6 per 1 μm . Thus, it was confirmed that the black composition of Tsukamoto et al. is outside the scope of claim 1 now on file.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 16th day of July, 2009

Ryo Nagase
Ryo NAGASE